

CLAIMS

What is claimed is:

1. Test structure of the step coverage for optical waveguide production, which comprises a substrate with a optical waveguide structure, is characterized in that: at least one
5 test structure is constructed at the remainder area outside the optical waveguide structure and has the same upper covering layer as the optical waveguide structure; and step coverage of the upper covering layer is tested by direct etching and the step coverage of the optical waveguide structure is extrapolated.
2. Test structure of the step coverage for optical waveguide production of claim 1
10 wherein the test structures are trench test structures.
3. Test structure of the step coverage for optical waveguide production of claim 1 wherein the test structures are completed by the silicon deep etching technology.
4. Test structure of the step coverage for optical waveguide production of claim 1
15 wherein the test structures use wet etching method to test the step coverage of the upper covering layer.
5. Test structure of the step coverage for optical waveguide production of claim 1 wherein the test structures use the annealing process to increase the step coverage of the upper covering layer over the test structure and the optical waveguide structure.
6. Test method of the step coverage for optical waveguide production, comprises the
20 steps of:
 - a. providing a substrate with a covering layer on the surface;
 - b. forming a waveguide layer on top of the covering layer;
 - c. forming a protection layer image using lithograph method over the waveguide layer,

which covers the appointed optical waveguide structure area;

- d. setting a test area in the area left out by the protection layer image and erasing the waveguide layer and the covering layer to expose the substrate;
 - e. constructing at least one test structure in the shape of the optical waveguide structure in the test area;
 - f. constructing a waveguide structure on the waveguide layer and removing the protection layer image;
 - g. depositing an upper covering layer to cover the test structure and the waveguide structure completely and forming the optical waveguide structure with the waveguide structure and the upper covering layer;
 - h. executing annealing treatment to the substrate; and
 - i. etching the test structure for testing the step coverage of the upper layer on the test structure and extrapolate the step coverage of the optical waveguide structure.
7. Test method of the step coverage for optical waveguide production of claim 6 wherein the test method comprises the repeating of steps h to step i after discovering the annealing process is incomplete after step i, until the annealing process is completed.
8. Test method of the step coverage for optical waveguide production of claim 6 wherein refraction rate of the covering layer and the upper covering layer are smaller than the refraction rate of the waveguide structure.
9. Test method of the step coverage for optical waveguide production of claim 6 wherein the test structures are trench test structures.
10. Test method of the step coverage for optical waveguide production of claim 6 wherein the etching test of the test structure comprises the steps of using wet etching to test

the step coverage rate of the upper covering layer.

11. Test method of the step coverage for optical waveguide production of claim 6 wherein the annealing process step is a heat treatment in a nitrogen environment at 1100 degrees Celsius for one to six hours.